SPMS EPE
Serviços Partilhados do Ministério da Saúde

X-eHealth

Exchanging Electronic Health Records
in a common framework

Overview

Jürgen Brandstätter

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant. Agreement Nº 951938

What is x-eHealth project?

X-eHealth
Exchanging Electronic Health Records
in a common framework

Citizens' secure access
to their health data, also across borders

Personalised medicine
through shared European data infrastructure

Citizen empowerment
with digital tools for user feedback and person-centred care

SPMS EPE Serviços Partilhados do Ministério da Saúde
Co-funded by the European Union's Health Programme (2014-2020)

Project Scope

X-eHealth's purpose is to develop the foundations for a common framework for **medical imaging, discharge letters, laboratory orders and results and rare diseases** to flow both alongside citizens care pathway and across health entities between EU Member States and neighbour countries.

Medical Imaging

Discharge Letters

Laboratory Results

Rare Diseases

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Key facts

- **European Commission funded project**
  - 36 consortium partners
  - 5 collaborative partners
  - 6 eHealth skilled experts
  - Policy and political actors mixed with national competent authorities

- **Webpage**
  - https://www.x-ehealth.eu/

- **Project schedule: 2 years**
  - Start: September 2020
  - End: End of August 2022

About to be extended until end of Nov 2022!

- **X-eHealth „nature“**
  - Between a (public health) policy intervention and a research project

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Project objectives

- Contribute to **the Digital Single Market Strategy** of the European Commission

- Lay the foundations to **advance the integration process of the eHealth services** features into the already in place European Cross Border Patient Summary
  - eHealth Digital Service Infrastructure (eHDSI)

European Health Data Space

- The key goals are to:
  - Improve the healthcare quality and safety for citizens by allowing them to **access** and manage **their electronic health record from any place in the EU**;
  - **Contribute to standardisation and harmonisation** of eHealth services in the EU by setting European agreements on diverse levels of interoperability;
  - **Contribute to defragmentation** of European services;
  - **Facilitate interaction** between patients and healthcare providers, to support prevention and citizen empowerment.

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Specific objectives

- To **reach a common understanding** in the EU on the efforts needed to adopt the commonly defined EEHRxF specifications at different levels and within their national EHR solutions

- To **define, specify and demonstrate the EEHRxF use cases**:
  - ***laboratory results***
  - ***medical imaging and reports***
  - ***hospital discharge reports***
  - ***patient summary for those suffering from rare disease and/or comorbidities***

- To elaborate the **roadmap** for the above-mentioned **use cases for future** uptake on the eHDSI as well as for the additional usage within MS on national, regional or local level

- To **submit the outcomes** and recommendations of X-eHealth regarding EEHRxF deployment to the relevant bodies on **policy, strategic and operational level**
  - e.g. eHealth Network, National Competence Centres for eHealth, eHDSI operators

- To propose a **governance framework** for the sustainable maintenance, evolution and distribution of standardisation and interoperability

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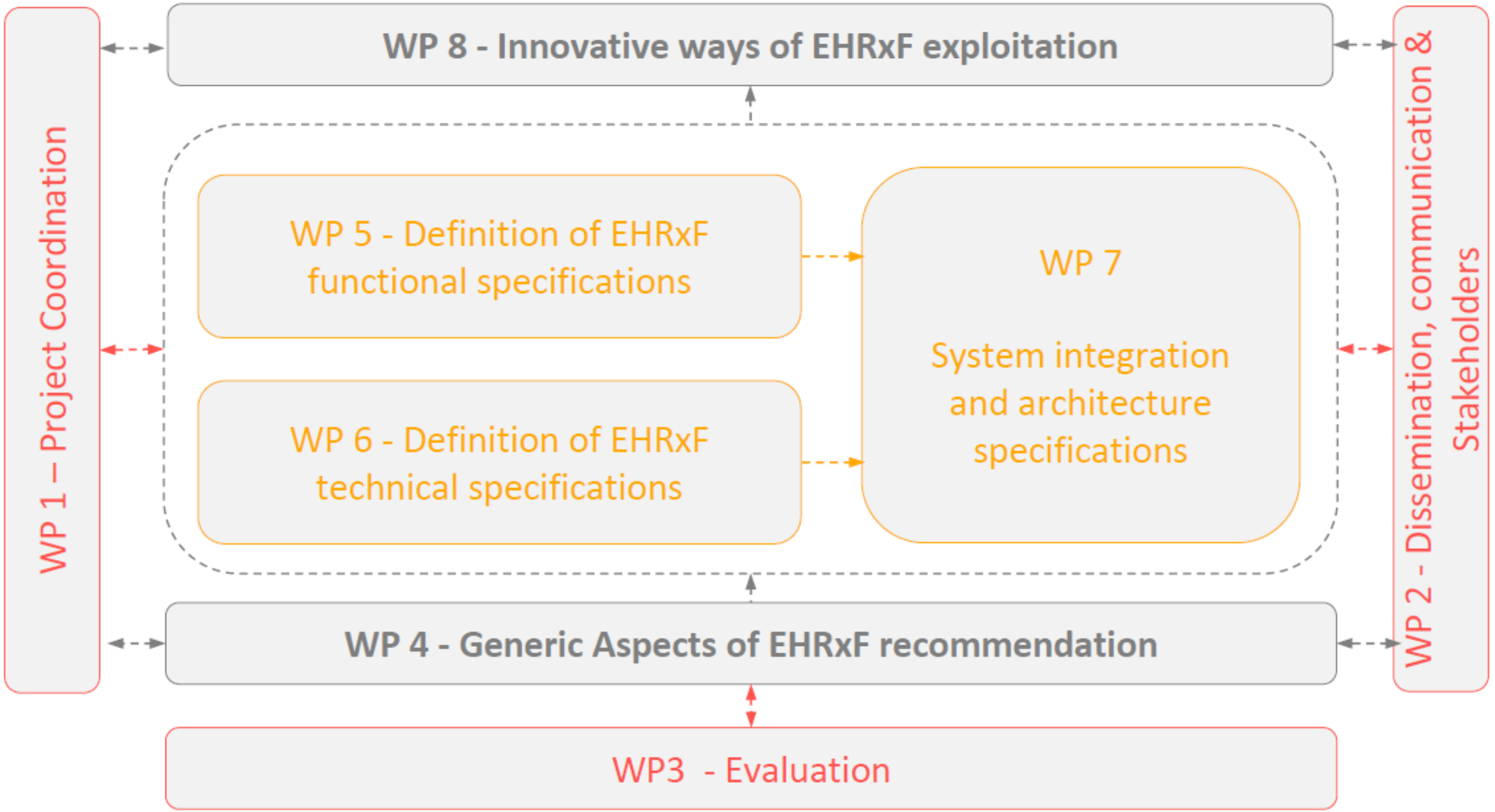
XeH Work packages



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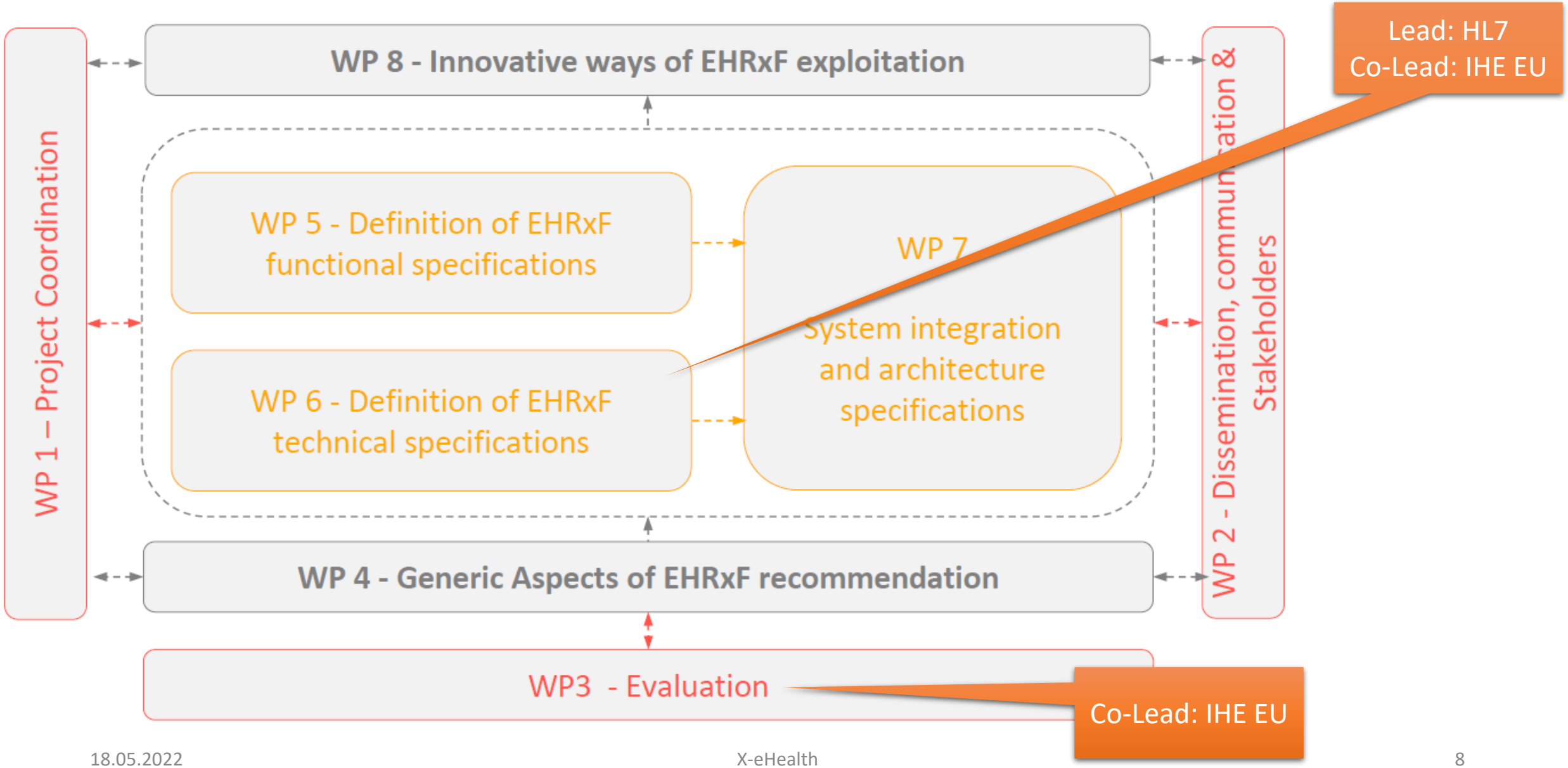
XeH Work packages



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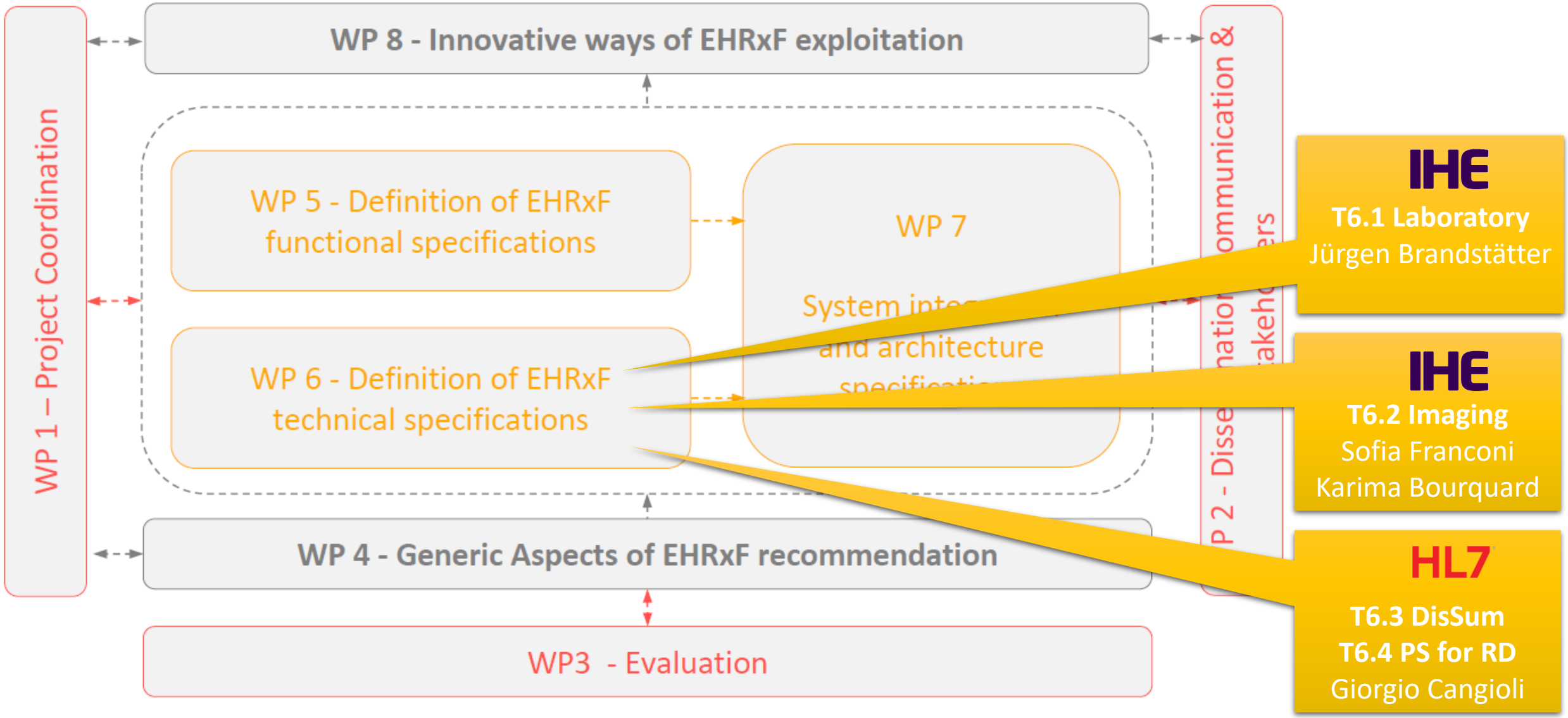
XeH Work packages



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Deliverables

- **D6.1 - X-eHealth Services Specifications**. Service (e.g. transport services) technical specifications for the domain and use cases selected

- **D6.2 - X-eHealth Testing Tools**. A set of testing tools for content and technical specifications that include test scripts

- **D6.3 - X-eHealth Implementation Guide**. Implementation Guide collecting harmonized and updated content technical specifications and associated artefacts initially specified

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Outcomes WP6

- **Specifications for …**
  - Laboratory Result Report
  - Diagnostic Imaging
  - Hospital Discharge Summary
  - Patient Summary for rare diseases

CDA: IHE XD-LAB
FHIR: Diagnostic Report Resource

CDA: DICOM PS3.20, IHE MRRT
FHIR: Diagnostic Report Resource

CDA: IPS, EU PS, IHE PCC DisSum, C-CDA DisSum
FHIR: IPS (HL7 + IHE profile), C-CDA on FHIR

CDA: IPS (HL7 + IHE profile), EU PS
FHIR: IPS (HL7 + IHE profile)

- **Specifications in 2 Standards**
  - Primary: **CDA**
  - Secondary: **FHIR** (if time and budget allows)

- **X-eHealth Tools**
  - CDA: Art-Decor
    - https://art-decor.org/art-decor/decor-project--eehrxf-
  - FHIR: GitHub, FHIR IG Publisher
    - https://build.fhir.org/ig/hl7-eu/x-ehealth/artifacts.html

Deferred to follow-up project

Laboratory Result Report

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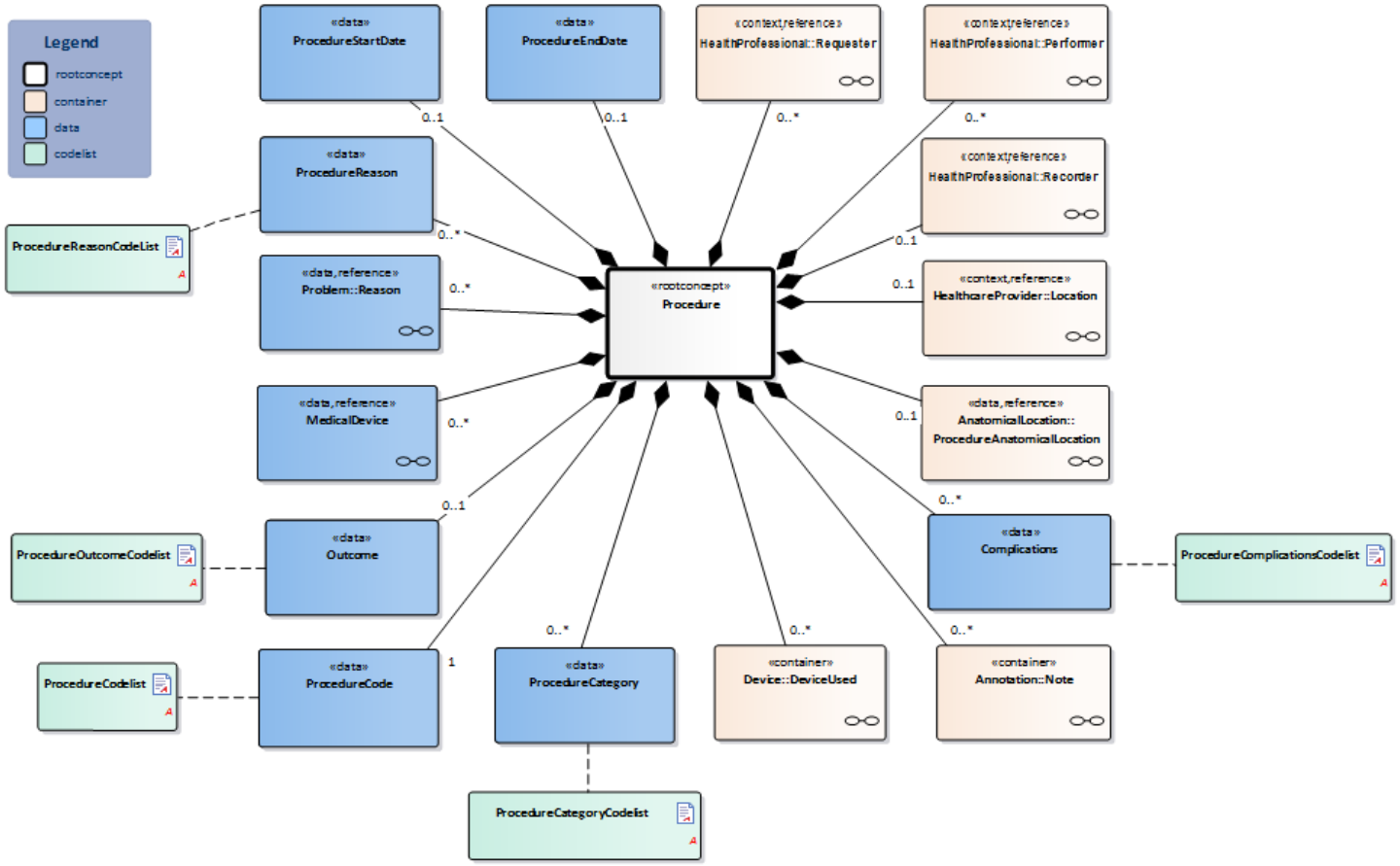
Clinical / Business Needs

- Laboratory is an essential domain for diagnostics and clinical decision making.
- Main cross boarder laboratory use cases:
  - **Laboratory test order**
    - Lab test order could be sent to laboratory in another country (e.g., to referential laboratory)
  - **Sharing laboratory test result report**
    - Lab results could be delivered to ordering party from another country
    - Lab results from country A could be delivered to a point of care in country B on request

Sharing of lab test results is essential for continuity of care in X-border situations

Clinical / Business Needs

- **Lab functional specifications (T5.3)**
  - Include all interoperability layers according to the ReEIF
- **LRR Information Model**
- **Innovations:**
  - Harmonization of Terminologies (e.g., Study Types, …)
  - Concept for Search & Filter (Metadata)
  - Cooperation and co-creation with Standards Development Organizations



Internas

- **Excellent cooperation between IHE and HL7 in WP6**
  - Close and friendly cooperation
  - Common goal: provide best-possible outcome

- **Tight contact with WP5 „Functional requirements“**
  - WP6 tries to hold on functional requirements
  - WP5 acknowledges feedback out of „implementation practice“ and standards

- **Feedback look to SDO community**
  - E.g. Laboratory: Requirements not covered by XD-LAB will not be simply specified, but discussed with IHE PALM

The coding systems

- **Observation codes**
  - Nomenclature for properties and units (NPU)
    - IFCC and IUPAC
  - Logical observation identifier names and codes (LOINC)
    - Regenstrief institute
  - SNOMED CT
    - SNOMED International

Mapping not trivial

- **Other Code system standardization, e.g.**
  - Study Types (e.g. Hematology studies)
  - Result values (e.g. negative, positive, bacteria found)
  - Specimen types (capillary sample, venous EDTA blood)
  - Methods (e.g. POCT or hospital lab method)

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Use of conventional test names

Example of conventional test names used for Leukocyte count

B-Leukocyter (sv)

B_Leukocyty (cs)

White blood count (en)

Leukocyte count (en)

WBC (en)

Leukozyten (de)

Λευκοκύτταρα (el)

Might lead to missunderstanding and serious mistakes!

Standard English test names

NPU: B—Leucocytes;num.conc.

LOINC: WBC (Bld) [#/Vol]

Standard test names in local language

(sv) NPU: Leukocyter (B; num. konc. [10^9/l] *)

(cs) NPU: Leukocyty (B; num. konc. [10^9/l] *)

(nl) LOINC: leukocyten:aantal/volume

(es) LOINC: Leucocitos:Concentración de número

Might not be understood by physicians trained for conventional test names

Use of conventional test names

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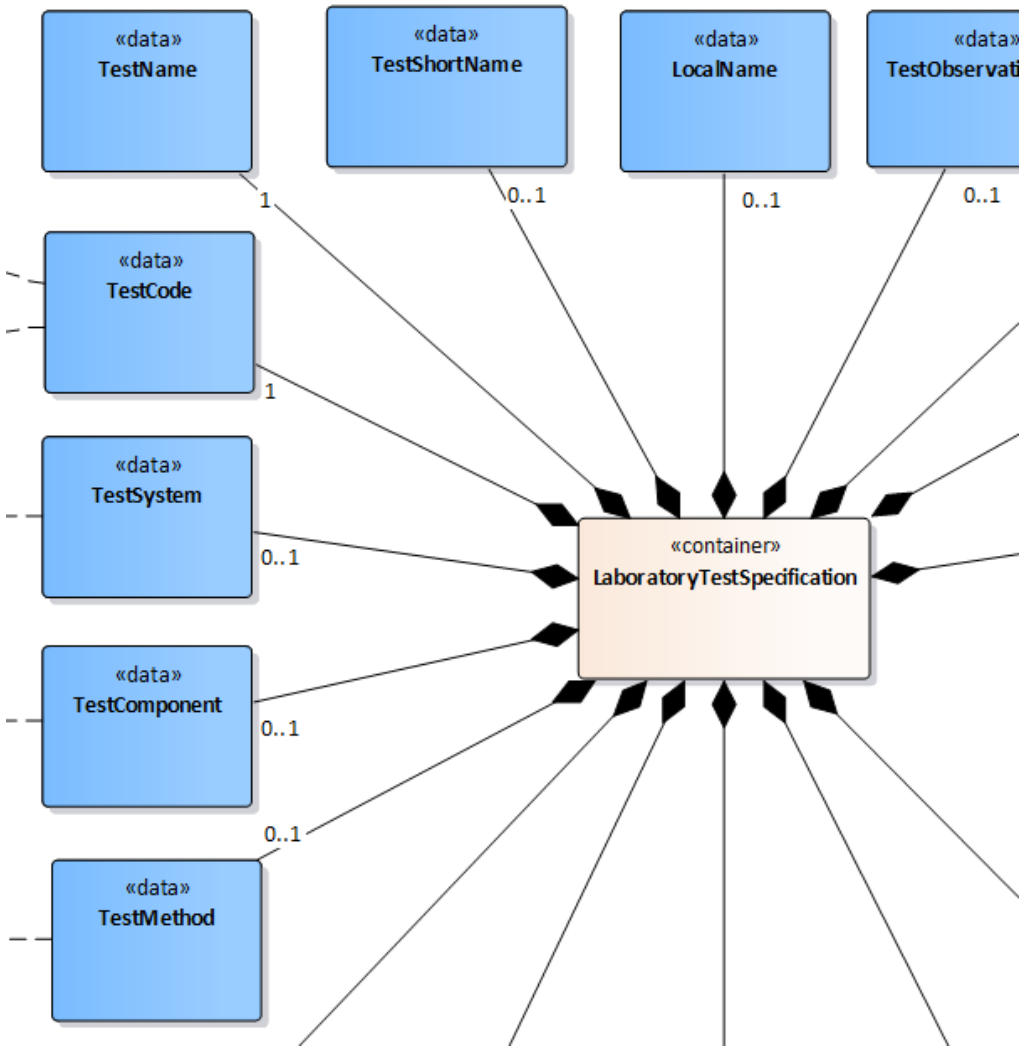

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Different result units used for the same test

Example of different units used for Leukocyte count

Leukocyte count = 12.0 * 1000/µL

Leukocyte count = 13 x $10^6/mm^3$

Leucocyte count = 140 000/mm^3

Leucocyte count = 20 x 10^9/L

Leucocyte count = 25 x $10^3(/mm^3)$

Leucocyte count = 12 000 * 10^3/mL

Luecocyte count = 1.2 * 1/nL

Leucocyte count = 18 * 10E9/L

Example of different units used for CRP

CRP = 50 mg/L

CRP = 7 mg/dL

Might lead to serious mistakes!

Different result units used for the same test

Example of different units used for Leukocyte count

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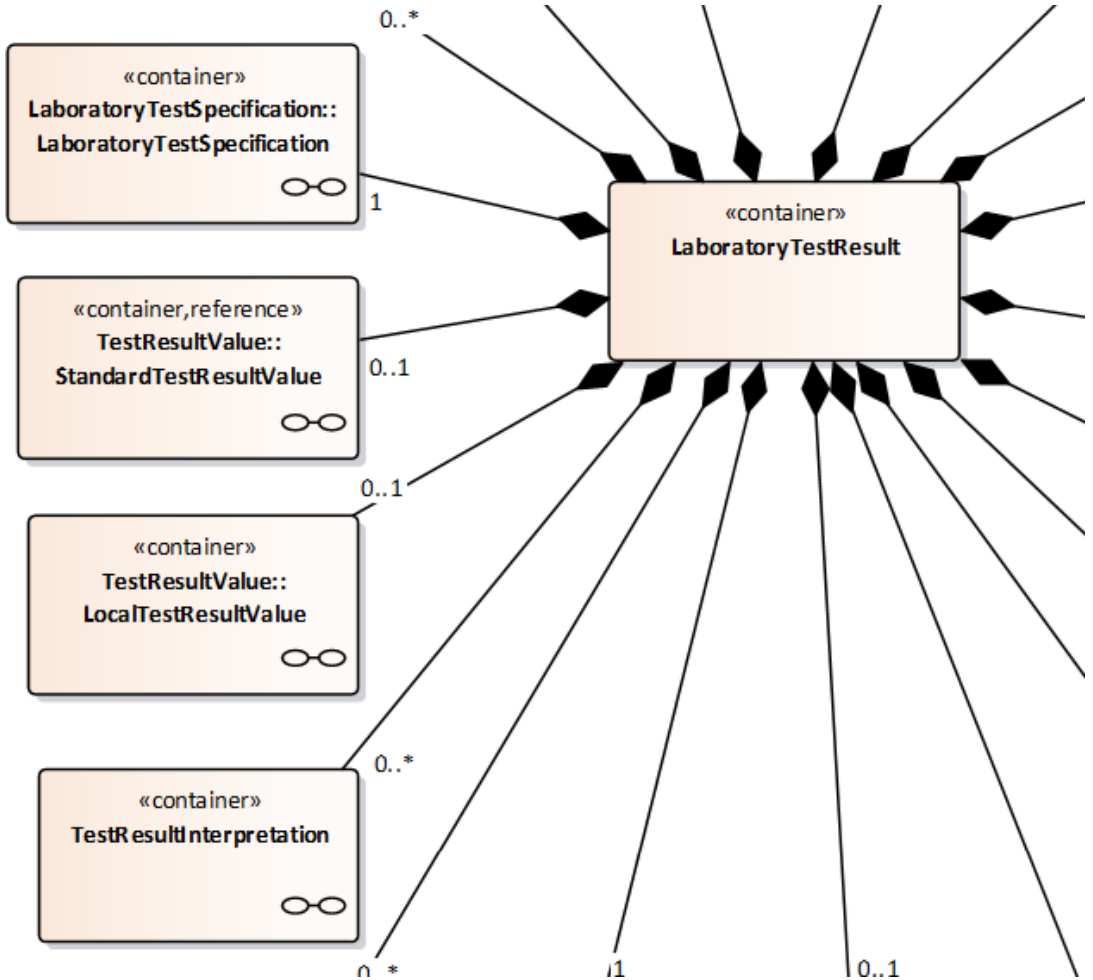
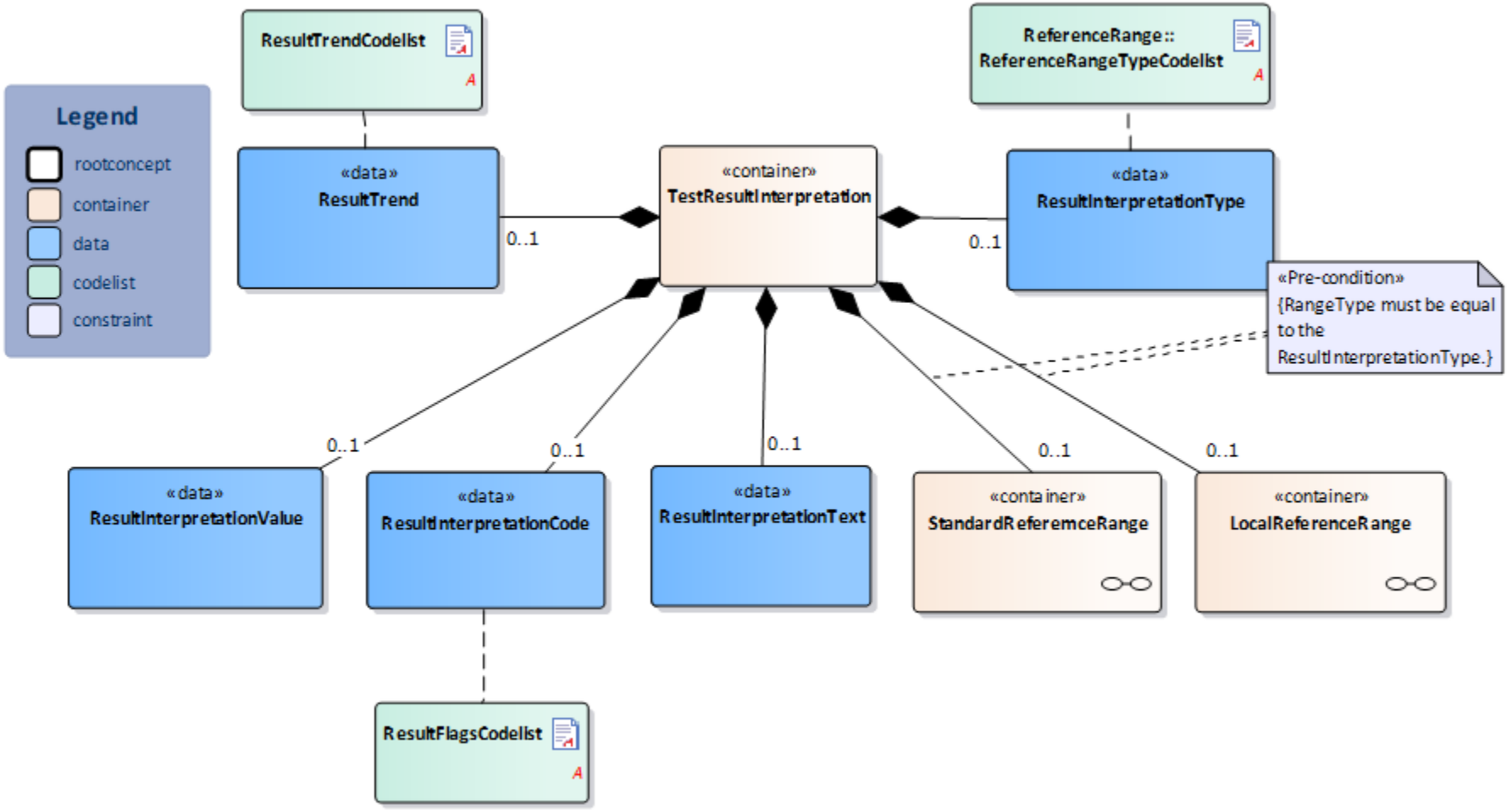


Result interpretation



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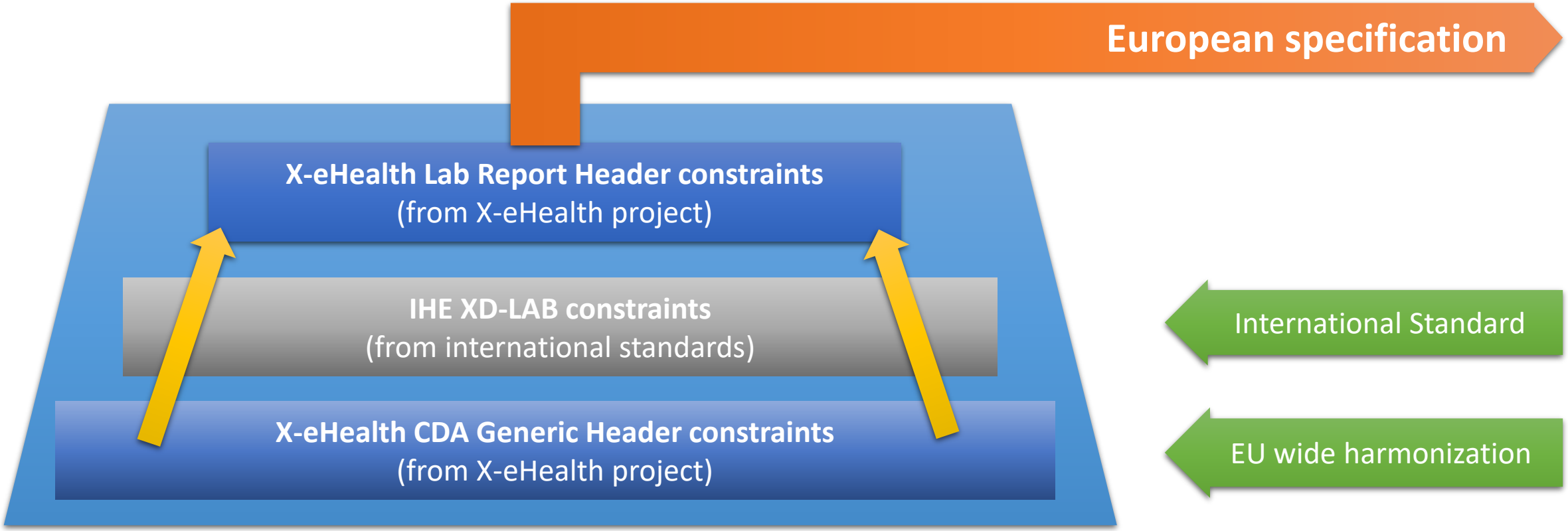
Administrative data standardisation



Example of well-formed laboratory report Header

Laboratory of immunology
Center of immunology and mikrobiology
Address tel.: phone no.
www.page.cz, email: imunology@domain.cz

Name:	**Patient Name**	HCP organization: Sample Hospital, surgical department	
ID:	121212121	HCP name	: John Physician
Age:	96	HCP org. ID :	Specialty: 001
Diagnosis:	A01 HIH No:111		
Received: 4.6.2009 9:19:00	Submitted: 12.6.2009 7:24:00	Printed: 12.6.2009 7:44:36	

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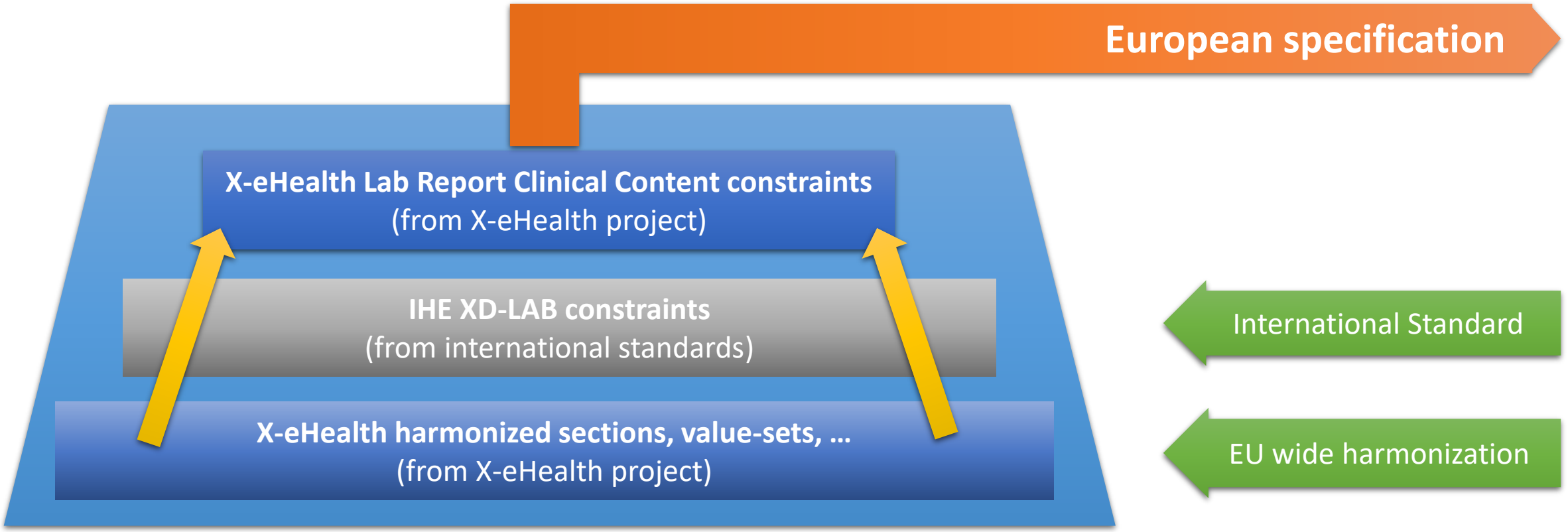
Clinical lab content standardisation



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Example of well-formed laboratory report Body

Test	4.6.2009 7:00	Result graphical assessment	Ref. range	Units
Humoral immunity				
»IgG	10,40	| |*| |	7,00 - 16,00	g/l
»IgA	1,17	| |*| |	0,70 - 4,00	g/l
»IgM	1,11	| |*| |	0,30 - 2,40	g/l
»C-reactive protein	< 3,19	| |*| |	< 5,00	mg/l
»C3-complement	1,09	| |*| |	0,75 - 1,40	g/l
»C4-complement	0,22	| |*| |	0,10 - 0,34	g/l
Infection immunity				
»ASLO	1590	| | |*	0 - 240	IU/ml
»HSV 1+2 IgG	4,60	| | |*	0,00 - 1,00	index
»HSV 1+2 IgM	0,50	| |*| |	0,00 - 1,10	index
Anamnestic levels of antibodies against HSV 1+2				
»CMV IgG	57,4	| |* |	< 30,0	AU/ml
»CMV IgM	0,17	| |*| |	< 0,50	index
Anamnestic levels of antibodies against CMV				
»EBV-VCA IgM	0,06	| |*| |	< 1,05	index
»EBV-EA (D) IgG	0,00	| |*| |	< 1,05	index
»EBV-VCA IgG	2,31	| |* |	< 1,05	index
»EBNA-1 IgG	3,30	| | *|	< 1,10	index
EBV comment	anamnestic titter			
Autoimmunity				
»ANA G,A,M	nuclear matrix			
»ANA G,A,M	80	| |*| |	0 - 160	titr
Total IgE				
»Total IgE	164,0	| |* |	< 150,0	kU/l

Ii-13798, Pp-13798

4.6.2009 7:00:00

The result should be evaluated in relation to the patient's medical history and clinical condition.

A list of accredited examinations (») is available on www.imunol-usti.cz

For information on collection procedures, transport conditions and an overview of laboratory tests, refer to the laboratory manual available on www.imunol-usti.cz. It also lists the names of the SOPs for individual accredited examinations in full. Measurement uncertainty is expressed in verification protocols and is available on request.

Results verified by: Name Surname

Test group or panel

Indication of accredited test

Test group or panel

Indication of results out of range

Inline textual interpretation of result

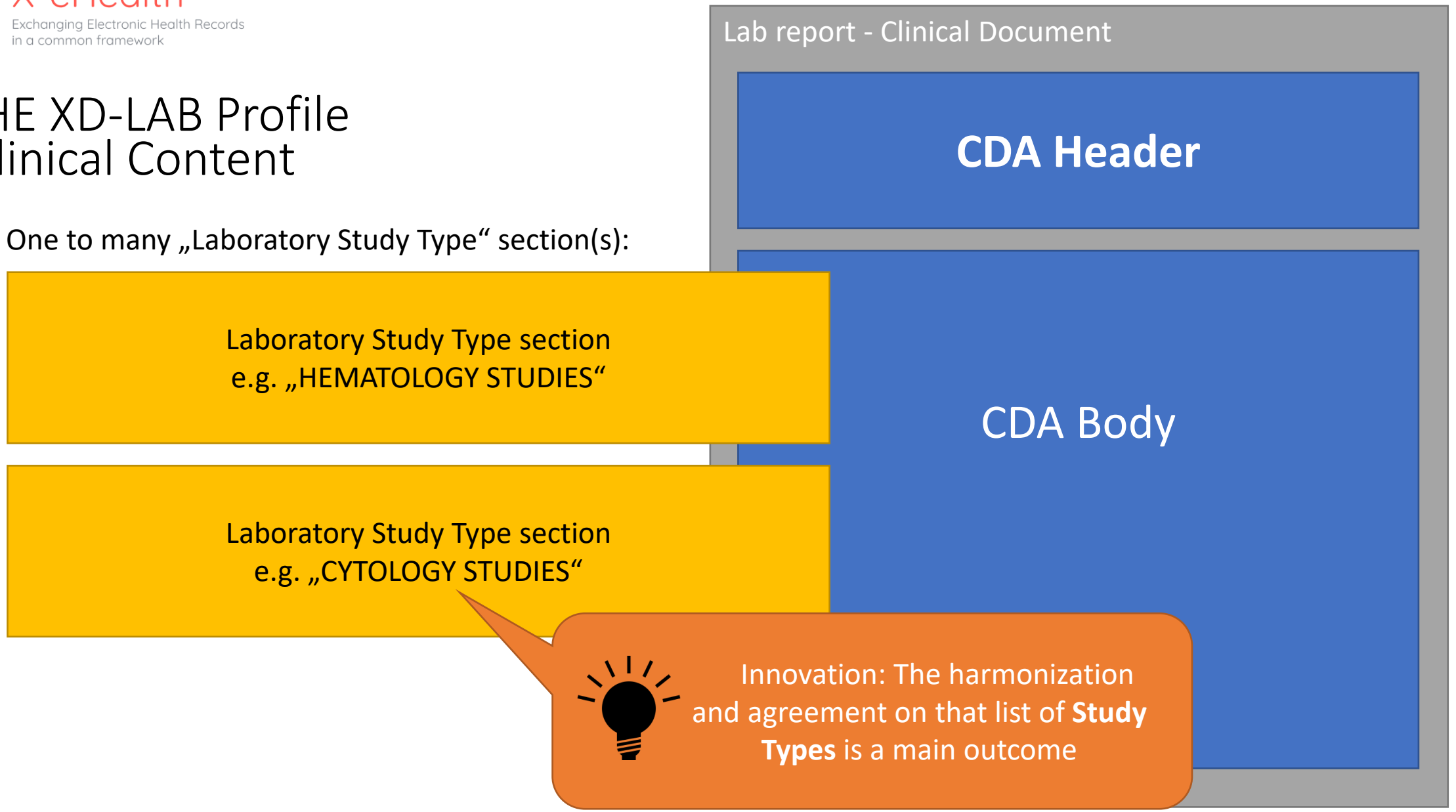
Reference range with High value only

Result report end note 2

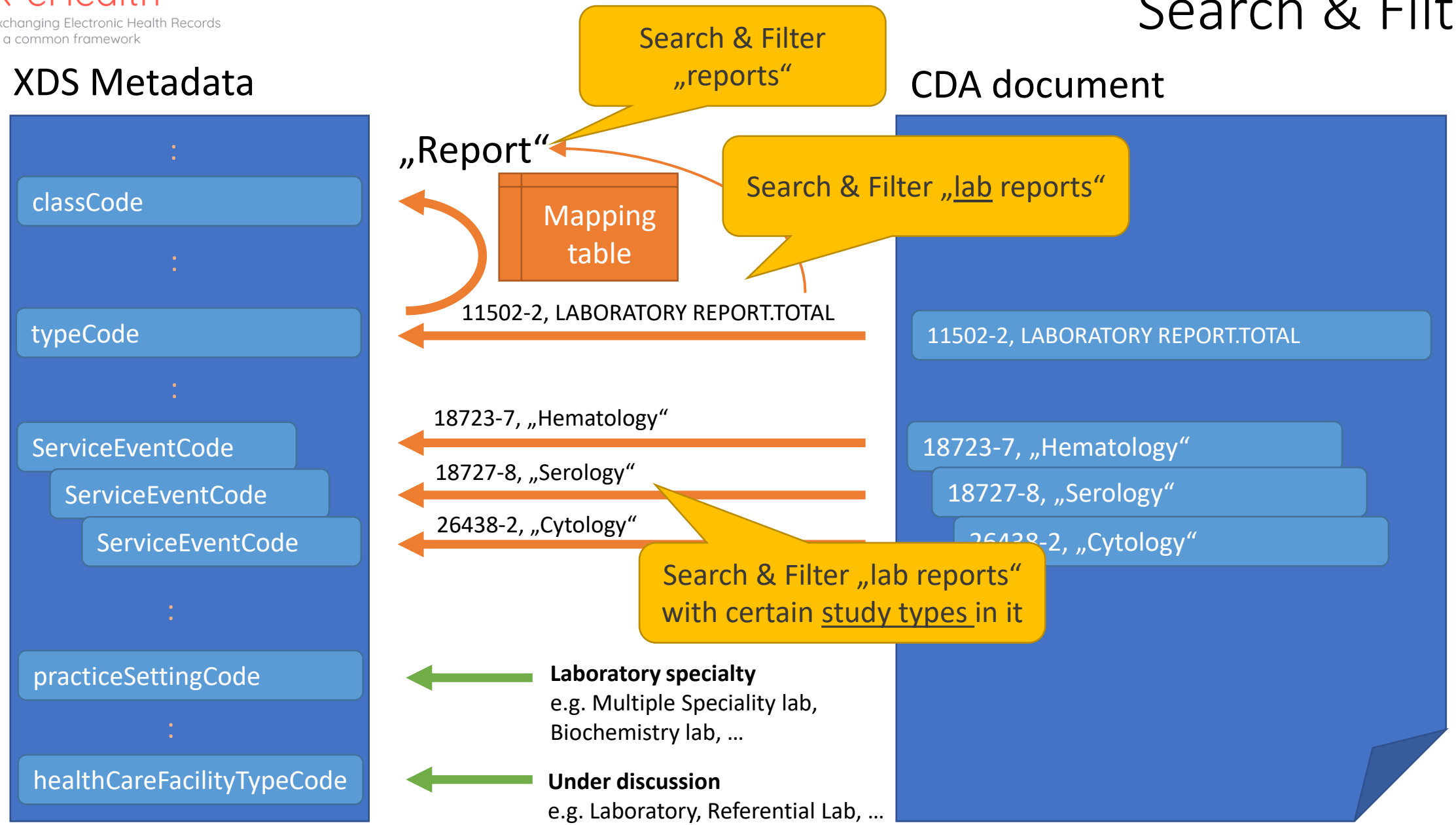
Result report end note 1

IHE XD-LAB Profile
Clinical Content

One to many „Laboratory Study Type“ section(s):



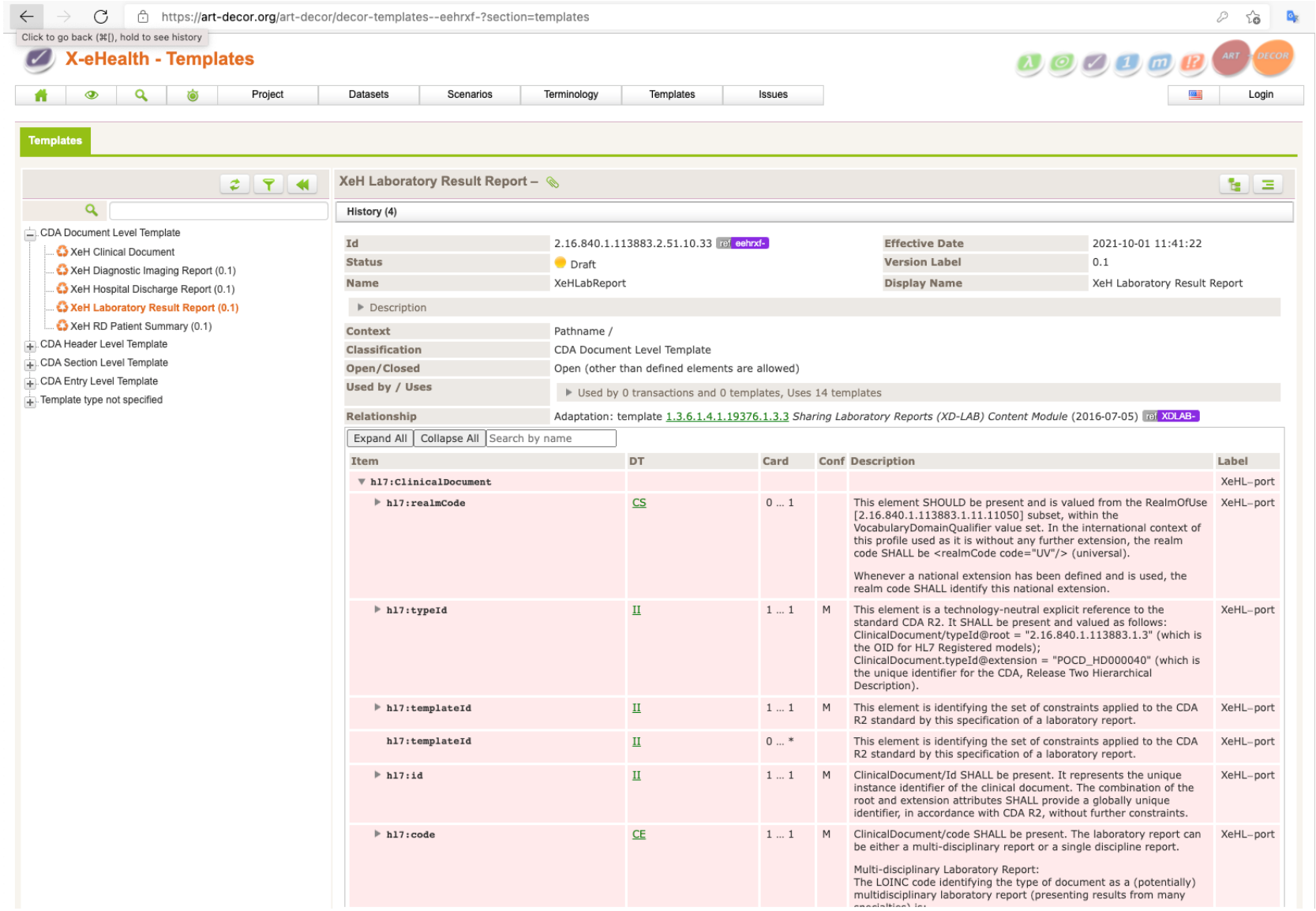
Search & Filter



Implementation Guides

Art-Decor based
Publicly available
Free of charge

Link to specifications: [Lab Report IG]



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Upcoming events

https://bit.ly/3rOBLbF

https://bit.ly/3vlJO21

https://bit.ly/3MxU65U

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Links

- X-eHealth Website: http://www.x-ehealth.eu/
- LinkedIn: https://www.linkedin.com/company/x-ehealth/
- Twitter: https://twitter.com/x_ehealth

Thank you

Jürgen Brandstätter

Member, IHE International Board
Executive Board, Global Consortium for eHealth Interoperability
Deputy Co-chair, IHE Europe
Co-chair GDC, Education

Director Standards Development, x-tention GmbH
CodeWerk Software Services and Development GmbH